GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF RESEARCH ADMINISTRATION

RESEARCH PROJECT INITIATION

Date: 22 June 1973

Project Title: "Water Resources Planning and Management"

Project No: C-10-504

Principal Investigator: Dr. L. Douglas James

Sponsor: Environmental Protection Agency

Agreement Period: From July 1, 1973 Until June 30, 1974

Type Agreement: Training Grant T-900111

Amount: $35,269 EPA Funds

Reports Required: Interim Report - As needed, submitted with renewal application.
Final Report - Due 30 days prior to conclusion of project period.

Sponsor Contact Person (s):

Mr. Robert F. Ruhl
Program Officer
Academic Training Board
Office of Water Programs
EPA
Washington, D. C. 20460

Assigned to: Environmental Resources Center

COPIES TO:

Principal Investigator	Library
School Director	Rich Electronic Computer Center
Dean of the College	Photographic Laboratory
Director, Research Administration	Project File
Director, Financial Affairs (2)	
Security-Reports-Property Office	
Patent Coordinator	Other_____

RA-3 (6-71)

GEORGIA INSTITUTE OF TECHNOLOGY

OFFICE OF RESEARCH ADMINISTRATION

RESEARCH PROJECT TERMINATION

Date: August 7, 1975

Project Title: Water Resources Planning & Management

Project No: C-17-501

Principal Investigator: L. D. James

Sponsor: Environmental Protection Agency

Effective Termination Date: August 31, 1971

Clearance of Accounting Charges: all charges have cleared

Grant/Contract Closeout Actions Remaining: None

Assigned to: Environmental Resources Center

COPIES TO:

Principal Investigator
School Director
Dean of the College
Director of Research Administration
Associate Controller (2)
Security-Reports-Property Office ✓
Patent and Inventions Coordinator
Library, Technical Reports Section
Rich Electronic Computer Center
Photographic Laboratory
Terminated Project File No. C-17-501
Other

RA-4 (5/70)

August 1974

ANNUAL REPORT

TITLE II PROJECT NO. C-2064, P.L. 88-379

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA--PHASE III

FISCAL YEAR 1974

Submitted to the Director
Office of Water Research & Technology
U.S. Department of the Interior
Washington, D. C. 20240

Environmental Resources Center
Georgia Institute of Technology
Atlanta, Georgia 30332

Form CWR-26-1974

Annual Report - Title II Project

CWRR Project Number: C- 2064	Funding Agreement Number: 14-31-0001-3359	Report as of: June 30, 1974 August 28, 1974

Name of Performing Organization:	Title of Project:
Environmental Resources Center Georgia Institute of Technology	Case Study of Remedial Flood Management in an Urban Area--Phase III

Status of Project as of Reporting Date: Completed [X]: In Progress [ ]

Total Est. Proj. Cost: Fed. Funds: $ 85,000 ; Non-Fed. Funds (if any): $ 7,200

Project Cost Information (7/1/73 through 6/30/74) 1/

Cost Categories 2/	Supported From: Federal Funds	Non-Fed. Funds 3/
Direct Salaries and Wages	$ 5,210	$
Employee Benefits (if not included elsewhere)	485	
Use, Rental or Depreciation Costs Included as Direct Charges*	386	
Non-Expendable Equipment		
Expendible Equipment, Material & Supplies	268	
Travel Costs Included as Direct Charges		
Other Direct Charges (Specify):		
Reports Publication	2,705	
Indirect Costs	2,970	
Other Costs (Specify):		
Computer	390	
TOTALS	12,414	

1/ If necessary, project costs may be estimated.

2/ Whenever possible, provide costs for categories listed. If cost categories other than those shown above are used, provide concise explanations as may be deemed necessary to insure proper understanding of the content of such costs.

3/ Estimates for "Non-Fed. Funds" ($ value of non-Federal contributions) should be provided if non-Federal contributions were contemplated by the funding agreement.

Comments:

Cumulative Total Project Expenditure to June 30, 1974.

Federal Funds	$85,000
Non-Federal Funds	7,363

*Rental of typewriter used in report preparation

Form CW-27 -1974

Annual Report - Title II Project

OWRR Project Number: C- 2064	Funding Agreement Number: 14-31-0001- 3359	Date of Report: August 28, 1974

Name of Performing Organization:	Title of Project:
Environmental Resources Center Georgia Institute of Technology	Case Study of Remedial Flood Management in an Urban Area--Phase III

Project Personnel and Student Training Information

Surnames of:	Degree (If Any)	Scientific Discipline or Academic Background
Principal Investigator(s):		
L. Douglas James	Ph.D.	Civil Engineering
Professional Associates:		
A. M. Lumb	Ph.D.	Civil Engineering
J. R. Wallace	Ph.D.	Civil Engineering
D. R. Brogan	Ph.D.	Statistics
Student Assistants (if any): 1/		
A. E. Johnson	B.S.	Civil Engineering
J. L. Paul	B.S.	Architecture

1/Includes research assistants who are currently registered as university or college students. State research institutes participating in the Title I program should include (incorporate) Title II student information in Form CW-9 used for Title I reporting.

Training of Water Resources Scientists and Engineers

Twelve registered graduate students worked as research assistants studying various topics covered by the overall study as described in previous annual reports. The two listed above completed their tasks in the period covered by this report.

All twelve have since accepted positions in which they can apply the training they received as part of this project to better water resources management. Five are with the Corps of Engineers, two are working on drainage and flood plain management for local governments, one is with state government, one is with a consulting engineering firm that has been involved in a number

of flood control and drainage studies, one is involved in real estate development, one is in construction, and one is on the water resources faculty of a Turkish University.

This project has also contributed indirectly to the training of water resources scientists and engineers. Much of material developed through this research has been incorporated into CE 6373, Flood Management, taught spring quarters at Georgia Tech. In 1974, this course was taken by 16 students who analyzed flood control alternatives on four Atlanta flood plains through OWRT Project No. B-082-GA. The hydrologic models developed through this project have been applied in performing a drainage study for DeKalb County, Georgia, that has provided support and training for six additional graduate and two undergraduate students.

ANNUAL REPORT - TITLE II PROJECT

Name of Reporting Official: L. Douglas James

Date of Report: August 28, 1974

Name of Performing Organization:

Environmental Resources Center
Georgia Institute of Technology

OWRR Project Number: C-2064

Funding Agreement Number: 14-31-0001-3359

FCST Research Category as Shown on NRP: 6B

Title of Project:

Case Study of Remedial Flood Management in an Urban Area--Phase III

Principal Investigator(s): L. Douglas James

A. RESEARCH PERFORMANCE AND APPLICATION OF RESULTS. In the space below, using additional sheets as necessary, provide information relating to the three items listed below. Normally, 500 or less words should be adequate. Lay language preferred.
(1) Research Accomplished. Describe research accomplished and the findings, results and conclusions relating thereto.
(2) Application of Results. Provide examples of application of research results, when possible, or statements as to how the findings may be useful in water management or conservation.
(3) Work Remaining. Provide statements of work remaining to be accomplished. (Note: If the project was completed during the fiscal year ending June 30, 1973 and a final report has been submitted, please make reference to this fact but complete items A-(1), A-(2), and C of this form OW-28 and also forms OW-26 and OW-27 to assist OWRR in compiling annual report information.)

Research Accomplished

The completed study investigated three diverse aspects of remedial flood management and produced three research reports. The citations annotated with brief descriptions of the principal findings and conclusions follow.

James, L. D., D. R. Brogan, E. A. Laurent, and H. E. Baltimore, "Community Well-Being as a Factor in Urban Land Use Planning," ERC-0174, Environmental Resources Center, Georgia Institute of Technology, Atlanta, Georgia, January, 1974.

Many engineers, planners, sociologists, psychologists, and architects recognize that the sense of well-being within an urban community may be profoundly affected by the physical characteristics of the residential environment. Flood plain land use can affect the residential neighborhood, and land use planners should strive to minimize such potential adverse effects from their design as may surface in the

problems symptomatic of a low level of well-being. Annual totals of 22 such symptoms were summed for 100 Atlanta city blocks. Also measured for each block were 116 physical characteristics, such as landscaping and land use, and 106 social characteristics, such as population density and income. The associations found in the data demonstrated that physical characteristics are roughly as important as social characteristics in explaining well-being problems. Some problems are better explained by physical while others are better explained by social characteristics. Physical features that attract many outsiders seem to accentuate well-being problems in a residential communtiy while those that isolate a community from crowds passing by seem to minimize such problems. Those selecting an optimum use for flood plain land should thus consider the role these areas can have in either attracting or providing a protective barrier against adverse outside influences.

James, L. D., "The Use of Questionnaires in Collecting Information for Urban Flood Control Planning," ERC-0274, Environmental Resources Center, Georgia Institute of Technology, Atlanta, Georgia, February, 1974.

Flood damages can be substantially reduced as individuals evacuate, flood fight, quickly repair damages, prepare in advance to cope with flooding, employ self protective measures, or modify buildings or layouts to reduce damageability. Individuals operating on their own initiative, however, tend to underemploy these measures. Local governments may promote their greater use through flood warnings, dissemination of hazard information, taxes on flood plain occupants, provision of expert advice on self protection, regulations governing flood plain land use and building practices, financial assistance to those implementing individual measures, or purchase and conservation of open space. Different means have differing degrees of success, and a given means is more successful in one community than in another. This is because communities vary in flood plain geometry, flood management policies, and the characteristics of flood plain occupants. Information on the local occupants is thus essential to a

well-formulated flood control program. A questionnaire for surveying flood plain occupants and a method for employing the resulting information in selecting appropriate flood control measures are developed.

Lumb, A. M., J. R. Wallace, and L. D. James, "Analysis of Urban Land Treatment Measures for Flood Peak Reduction," ERC-0574, Environmental Resources Center, Georgia Insitute of Technology, Atlanta, Georgia, June, 1974.

Two computer models for urban hydrologic studies were developed. A Small Urban Watershed Flood Hydrograph Model was developed to study how downstream flooding is affected by the layout of buildings and paved areas on small watersheds. Storm runoff is simulated from the physical characteristics of the land surface and of the drainage channels. An Urban Hydrograph Routing Model was developed to study how downstream flooding is affected by the layout of land by use categories (commercial, residential, industrial, etc.) in larger watersheds. The model can be used to study the effects of changes in land use and channel characteristics. Applications of these models showed that 1) small detention storage basins can control flood runoff from newly developed areas but become progressively less effective when dealing with larger and larger watersheds; 2) the use of natural instead of paved collector channels has a similar pattern of substantially reducing headwater flooding but diminishing effectiveness as one goes downstream; 3) draining roofs and driveways onto dense turf is effective immediately downstream and, because the resulting infiltration reduces flood volumes, may cumulatively have a greater effect in larger watersheds; 4) terracing is effective if dense turf is maintained on the terraces, but bare dirt terraces do little good; and 5) commercial and industrial areas accentuate flooding most when located near the middle of the watershed tributary to a location suffering extensive flood damage.

Application of Results

As the results have only recently been distributed to potential users, there has been little time for others to apply the findings and for information on their applications to get back to the Principal Investigator. Considerable interest has been expressed in the project publications and in the four papers presenting project findings at professional meetings. Students who worked on the project or who took courses upgraded by project results are undoubtedly better equipped to deal with flood problems.

DeKalb County, Georgia, has funded a project at Georgia Tech to determine flood risk along selected watercourses as a function of tributary land use and channel characteristics. Many of the concepts and methods developed in this study are being used to help develop a flood hazard evaluation model for the use of County planners and drainage engineers.

The concepts developed in the first two reports represent a more radical departure from prevailing practice and can thus have a slower impact. The findings on the long range impact of flood plain land use on a community and on how to select the means that will be most effective in dealing with a given population are, however, very important and will need to be eventually integrated into practice.

Work Remaining

The first two reports have been completed, mailed to OWRT, and distributed as requested. The third report has been completed, reviewed by OWRT, and is currently being reproduced. Copies should be available for transmission to OWRT and distribution in September, 1974.

OWRR Research Project Number: C- 2064 | Date of Report: August 28, 1974

Title of Project:

Case Study of Remedial Flood Management in an Urban Area--Phase III

B. Project-Related Publications. In the space below, provide a listing by title, author, volume, page number, etc., of project-related publications or reports issued, and papers prepared. (Complete & accurate citations will be greatly appreciated.) Do not include unpublished progress reports submitted to OWRR pursuant to provisions of the funding agreement.

Three Parts of the Technical Completion Report

1. James, L. D., D. R. Brogan, E. A. Laurent, and H. E. Baltimore, "Community Well-Being as a Factor in Urban Land Use Planning," ERC-0174, Environmental Resources Center, Georgia Institute of Technology, Atlanta, Georgia, January, 1974.

2. James, L. D., "The Use of Questionnaires in Collecting Information for Urban Flood Control Planning," ERC-0274, Environmental Resources Center, Georgia Institute of Technology, Atlanta, Georgia, February, 1974.

3. Lamb, A. M., J. R. Wallace, and L. D. James, "Analysis of Urban Land Treatment Measures for Flood Peak Reduction," ERC-0574, Environmental Resources Center, Georgia Institute of Technology, Atlanta, Georgia, June, 1974.

Publications in Print

4. James, L. Douglas, "A Decision-Sequence Model of Residential Occupancy of Urban Flood Plains," Proceedings of International Symposium on Mathematical Modelling Techniques in Water Resources Systems, Ed. Asit K. Biswas, Environment Canada, Ottawa, Ontario, May 1972, pp. 331-340.

5. James, L. Douglas, "Surveys Required to Design Nonstructural Measures," Meeting Preprint 1881, ASCE National Water Resources Engineering Meeting, January 29-February 2, 1973, Washington, D. C., 22 pp.

6. James, L. Douglas, "Surveys Required to Design Nonstructural Measures," Proceedings of the ASCE, Vol. 99, No. HY10, October 1973, pp. 1823-1836.

7. Brogan, Donna R. and L. Douglas James, "The Input of Urban Living on Mental Health," in Exploring Mental Health Parameters, Ed. Fred R. Crawford, Atlanta: Paje Publishing, Inc., 1974, pp. 309-326.

Papers Accepted for Publication

8. James, L. Douglas and Donna R. Brogan, "The Impact of Open Urban Land on Community Well-Being," Man Environment Interactions: Evaluation and Applications: Proceedings of Edra 5, Ed. Daniel H. Carson, Chapel Hill, North Carolina: Edra, Inc. 1974.

Lumb, Alan M., L. Douglas James, and Allen Johnson, "Remedial Measures for Urban Flood Peak Reduction," Proceedings of the National Symposium on Urban Rainfall and Runoff and Sediment Control, Lexington: University of Kentucky College of Engineering, July 1974.

Papers in Preparation

James, L. Douglas and Donna R. Brogan, "Community Well-Being as a Consideration in Urban Flood Plain Management," submitted to Water Resources Research.

Wallace, James R., "The Effect of Land Use Change on the Hydrology of a Developing Urban Area," submitted to Hydraulics Division, American Society of Civil Engineers.

Copies of items 1, 2, 4, and 5 have previously been transmitted to OWRR. Copies and abstracts of items 6 and 7 are enclosed. Other publications will be forwarded as they become available.

SELECTED WATER RESOURCES ABSTRACTS

INPUT TRANSACTION FORM

1. Report No.

2.

3. Accession No.

W

SURVEYS TO DESIGN NONSTRUCTURAL MEASURES

5. Report Date

6.

8. Performing Organization Report No.

James L. Douglas

9. Organization

Environmental Resources Center, Georgia Institute of Technology, Atlanta

10. Project No.

11. Contract/Grant No.

13. Type of Report and Period Covered

12. Sponsoring Organization

15. Supplementary Notes

Journal of the Hydraulics Division, ASCE, Vol. 99, No. HY10, p 1823-1836, October, 1973. 3 ref.

16. Abstract

Structural measures reduce flood damage by controlling water whereas nonstructural measures must change the land use habits of, and thus in a sense, control people. Specific nonstructural measures must be designed to communicate hazard information and persuade people to react to it in accordance with public policy. Just as structural design requires information on local topography and hydrology, nonstructural programs (land use control, flood proofing, warning systems, etc.) require surveys to gather project specific information to tailor communication and persuasion techniques to the people of a particular flood plain. These individuals must be identified so that information can be obtained to classify them according to their probable comprehension of information and willingness to yield to persuasion. Research is underway to develop workable survey techniques. Surveys of Atlanta flood plain residents provide initial indication of the range and kinds of variation a community can expect in response to nonstructural flood control measures.

17a. Descriptors

*Attitudes, Behavior, Communication, *Flood control, *Flood plain zoning, Floodproofing, *Hydraulics, Information systems, Land development, *Land use, *Social participation, Warning systems

17b. Identifiers

17c. COSATI Field & Group 6F

18. Availability

19. Security Class. (Report)

20. Security Class. (Page)

21. No. of Pages

22. Price

Send To:

WATER RESOURCES SCIENTIFIC INFORMATION CENTER
U.S. DEPARTMENT OF THE INTERIOR
WASHINGTON, D. C. 20240

L. Douglas James

Georgia Institute of Technology

SELECTED WATER RESOURCES ABSTRACTS
INPUT TRANSACTION FORM

1. Report No.

3. Accession No.
W

4. Title
THE IMPACT OF URBAN LIVING ON MENTAL HEALTH

5. Report Date

6.

8. Performing Organization Report No.

7. Author(s)
Brogan, D. R., and James, L. D.

10. Project No.

9. Organization
Environmental Resources Center, Georgia Institute of Technology, Atlanta

11. Contract/Grant No.

13. Type of Report and Period Covered

12. Sponsoring Organization

15. Supplementary Notes In: "Exploring Mental Health Parameters: A Regional Atlanta Mental Health Source Book," Fred R. Crawford, Ed., July, 1974, Paje Publishing, Inc., p. 309-326. 2 fig, 5 tab, 26 ref.

16. Abstract The hypothesis that the well-being of people living in an urban community relates to the natural and manmade characteristics of their residential environment was tested with data collected from 100 residential blocks chosen at random from a population of diverse residential neighborhoods in Atlanta. Encounters of block residents with health care or law enforcement officials were recorded over a year. A large number of physical attributes of each block were measured as were a large number of the socioeconomic characteristics of their resident populations. Regression analysis was used to find the physical attributes of a block most frequently associated with the encounters and to control for the various socioeconomic characteristics. The results showed that the physical attributes of a block associate more closely with numbers of certain types of encounters (juvenile and drug problems) and that the socioeconomic characteristics associate more closely with other types (serious crime and severe mental illness). The associations also suggest that frequent and fleeting exposure of a residential community to outsiders generates acts that tend to downgrade the physical environment and create hostility with and among those who identify with that environment.

17a. Descriptors
*Social Aspects, Aesthetics, Social impact, *Urban sociology, *Psychological aspects, City planning

17b. Identifiers
*Crime, *Mental health

17c. COWRR Field & Group 6B

18. Availability

19. Security Class. (Report)

20. Security Class. (Page)

21. No. of Pages

22. Price

Send To:
WATER RESOURCES SCIENTIFIC INFORMATION CENTER
U.S. DEPARTMENT OF THE INTERIOR
WASHINGTON, D. C. 20240

Abstractor L. Douglas James
Institution Georgia Institute of Technology